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Special Article - New Chain Volume estimates for the Services sector

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INTRODUCTION

Improved methods for calculating chain volume estimates of gross value added for some important service industries will be introduced in the June quarter 2001 issue of **Australian National Accounts: National Income Expenditure and Product** (Cat. no. 5206.0). Counterpart components of government final consumption expenditure will also incorporate the new methods. Current price estimates will be unaffected.

The industries most affected by the introduction of the new methods are:

- Health and Community Services (ANZSIC, Division O)
- Education (ANZSIC, Division N)
- Transport and Storage (ANZSIC, Division I)
- Communication Services (ANZSIC, Division J)
- Property and Business Services (ANZSIC, Division L)

For the health and community services and education industries, the new method will be used to backcast estimates to September quarter 1993. Most of the changes to the other industries can only be introduced from September quarter 1999. Prior to those periods, the existing series will be spliced onto the new. Changes will flow through to the full suite of national accounts releases, including State and Territory accounts where relevant.

This article describes the reasons for the changes, details the new methods and compares the new and existing industry estimates for health and community services, and education services.

Overall, these changes are expected to have a positive impact on chain volume GDP growth rates. For 1999-2000 it is estimated that the impact will be to raise GDP growth by 0.3 percentage points.

BACKGROUND TO THE CHANGES

Historically, the measurement of service industry volumes has presented national accountants both here and abroad with a number of difficulties. Many services are heterogeneous in nature and it is difficult to observe the underlying quantum of service provided or received. Moreover, some services are predominantly provided by non-market producers-they are provided by government or non-profit institutions free of charge or at prices significantly below costs, so sales or price information are non-existent.

More often than not, growth in input volumes have tended to be used as a proxy for growth in volumes of service industry output and value added. Hours worked or costs deflated by wage and other input price indexes have been primary components of these input-based methods.

The main disadvantage of using input methods is that they do not reflect changes in output resulting from increased productivity. For this reason, a number of services industries have been excluded from the scope of ABS productivity statistics. There have been a number of initiatives underway in recent years to improve the availability and quality of services industry data, some of which have already been introduced in the national accounts. The present round of improvements stem from the following:

- A major research effort undertaken within the ABS to investigate the measurement of non-market output and productivity. This work is ongoing, but improved methods for health and education are now available for inclusion in the national accounts, and .
- The recent expansion in scope into service industries of ABS quarterly surveys of output and prices has provided the means by which to derive superior chain volume estimates of output for a number of service industries. For details of the expanded surveys refer to **Inventories and Sales, Selected Industries, Australia** (Cat. no. 5629.0) and **Producer Price Indexes For Selected Service Industries** (Cat. no. 6423.0).

The measurement of service industry volumes has been the subject of much international discussion. The soon to be published Handbook on Price and Volume Methods in National Accounts by Eurostat (the statistical office of the European Union) presents the latest international thinking on the subject. Industry by industry, it recommends the use of quality adjusted output volume indicators or output deflated by constant-quality price indexes wherever available. The use of input volume indicators is generally regarded as the least desirable method. However, it is recognised that for a number of industries where non-market producers are predominant, appropriate output volume indicators are difficult to construct. This is particularly so for industries where services are consumed collectively, such as much of public administration and defence. For this reason, some input-based estimation is likely to remain, even in the longer term.

By convention, current price estimates of non-market services are valued at the cost of providing them. However, this convention does not mean that the volume of services should also be derived by reference to costs. SNA93 recommends using direct output measures for measuring the volume of output, in particular for health and education services which are consumed individually. It is also important to note that the objective is to measure the quantities of services actually delivered to households, not the benefits derived from those services by society. For example, in the case of education, the services consist of the volume of teaching provided by producers of education services to students. It should not be measured by the level of knowledge or skills possessed by members of the community as that can be affected by a host of factors out of the control of the education establishment-such as degree of parental support, work undertaken outside of school, etc.

Australia will be one of the first countries to implement output indicators in the national accounts for a major component of the non-market sector. It is expected that a number of other countries will do so in the near future.

HEALTH AND EDUCATION SERVICES

Health and education comprise around 10% of GDP, and government expenditure on health and

education services represents around 45% of total government final consumption expenditure. Components of the health industry in particular have been subject to substantial technological change in recent years. The expectation that input methods were more than likely understating the rate of volume growth-for health output in particular-and the availability of suitable output data made these two industries an obvious starting point for investigations of alternative methods for non-market services.

ABS has spent a number of years developing experimental output volume estimates for health and education, and they have been subjected to extensive peer review before being considered for inclusion in the national accounts.

The detailed studies were undertaken using annual data only. Wherever possible, quarterly estimates will be compiled using the same output indicators. However, there are some major gaps in the availability of quarterly data, making it necessary to adopt interpolation and extrapolation techniques using suitable proxy indicators.

Health services-annual estimates

Health services make up 90% of the total value added of the combined industries of health and community services. It has not been possible to develop output indicators for the community services component (they remain input-based). Health services are composed of services provided in hospitals and nursing homes; medical services provided by general practitioners and medical specialists; dental; optometry and optical dispensing; community health services; paramedical; veterinary and ambulance services. Over 55% of health services are supplied by hospitals and nursing homes, the majority being provided by the government sector.

The Department of Health and Aged Care collects detailed treatments data from all government and private acute care hospitals in accordance with the Australian National Diagnostic Related Groups Classification (AN-DRGs). The current version of the classification consists of over 660 separate diagnostic related groups. Volume is represented by the number of episodes (separations) for each group.

Detailed cost studies have also been undertaken by the Department of Health and Aged Care in order to construct average cost weights per separation for each diagnostic related group. The ABS has used these cost weights to derive a chain weighted volume index since 1995-96. For prior years the cost weights are fixed with base year 1995-96.

Measurement of outpatient episodes provided by hospitals remains a problem. Outpatient episodes are currently excluded from the index because data of satisfactory quality are not available. This is not expected to have an appreciable impact on the quality of the overall estimates.

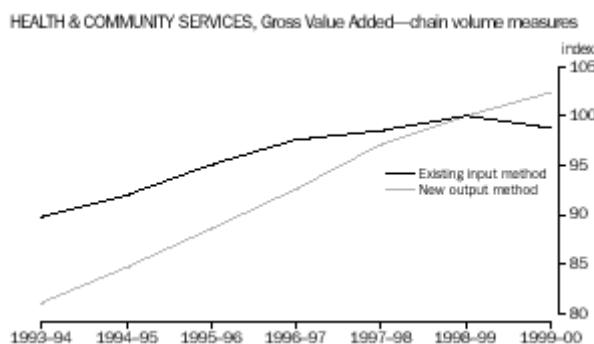
For nursing homes, the number of patient days categorised by level of care is used. Nursing home patient days are classified under a Resident Classification Instrument (RCI) rating system which measures the level of care required by a patient. Data are also available on the cost per patient per day for each of the RCI categories (this cost is based on a care component and an infrastructure component). An annual chain weighted volume index has been constructed using these cost weights.

For medical services, detailed data are available from the Medicare system. For general practitioners and medical specialists (e.g. in obstetrics, anaesthetics, diagnostic imaging and surgical operations), output is measured by the numbers of attendances weighted together by fees charged. In the case of pathologists, the number of tests has been used as the output volume indicator.

Chain volume estimates for the remaining health services components-dental, optometry and optical dispensing, community health centres, paramedical, veterinary and ambulance services-will continue to be based on administrative data deflated using relevant price indexes.

Estimates on the new basis will be carried back to 1993-94. Earlier years will be backcast using the previously published growth rates, based on input costs.

The effect of the change from the existing input-based method to the method outlined above is demonstrated in the graph below. It shows an average growth in the chain volume measure of the gross value added of health and community services between the years 1993-94 to 1999-2000 of 4.0% per annum, compared to 1.6% under the existing method.



The ABS believes that the new method is a significant advance on the existing input-based method. It captures much of the anticipated increased productivity that one would expect from technological improvements in the industry. A shortcoming is the degree to which it can capture all quality change in the services provided. Using a fine level of detail helps to capture compositional quality changes, namely any shift to new and more advanced medical treatments being offered. It does require that cost data are regularly updated to properly weight these new treatments and diagnostic techniques. However, the new method fails to detect quality changes occurring within a particular medical treatment category. By undertaking detailed analyses of changes in the quality of treatments it may be possible to develop better indicators of output within AN-DRG categories at some time in the future

Education services-annual estimates

The new chain volume estimates of education output are based mainly on annual student enrolments. Enrolments for each level of education are weighted together by the cost of providing those services.

Student numbers for primary schools and secondary schools are converted to full time equivalents (part-time students are counted as 0.5 of a full time student). Module hours are available for vocational education and are used in preference to student numbers.

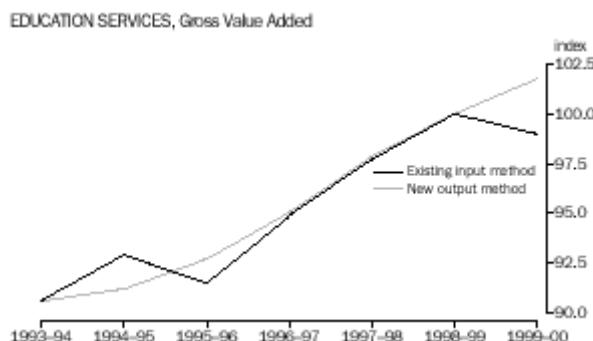
For universities, full-time equivalent student numbers enrolled in each of eleven discipline groups are used as the output indicators for the tuition component. In the absence of actual cost data, HECS weights are used as a proxy to weight student numbers in each discipline group. The university research component is estimated by weighting together data for the number of publications and student research completions.

The chain volume estimates for the remaining education services-pre-schools and other education services-will continue to be derived using suitable input price indexes.

In the main, the new output indicators simply capture changes in the number of students enrolled adjusted for compositional change between the various levels of education, and subjects in the case of universities. They do not capture any quality change over time in the education services provided. A number of national statistical offices and international agencies, including the ABS, have investigated ways of incorporating quality adjustment factors into the education output measure. For example, class sizes and public examination results have been considered as indicators of change in the quality of the education service. Adjusting for class size has been widely rejected on the grounds that there does not appear to be an observable relationship-certainly not a linear one-between class size and the quality of services provided. Public examination results are useless unless the same test standards are maintained over time, and while results from standardised tests provide a better prospect, changes in scores over time could also reflect external factors-such as changes in the quality of home life-as well as changes in the quality of education services. Nevertheless, once a sufficient time series of such data becomes available and after taking into account external factors, it may be possible to at least discern the direction of change in quality.

Despite this shortcoming, the ABS is of the view that the output indicator method is conceptually superior to the existing input-based method, and yields more plausible results for Australia. This view is consistent with the recommendations in the Eurostat Handbook on Price and Volume Methods in National Accounts. It is also consistent with how output would generally be measured if education were predominantly provided in the market. In that case the volume of output would be based either on the number of fee paying students adjusted for changes in the quality of the service provided or equivalently current price output deflated by a constant-quality price index. Although the output indicator method is not quality adjusted, neither is the existing input method.

A comparison of results for gross value added under the new and existing methods is shown in the graph below. It shows an average annual growth in education gross value added between the years 1993-94 to 1999-2000 of 1.9% per annum, compared with 1.5% under the existing method. While this does not result in a significant change in the growth rates it does provide a more stable pattern of growth than under the existing method.



Health and education services-quarterly estimates

Ideally, the same methods and data sources would be used to compile the quarterly estimates. However, because of gaps in quarterly data availability or timeliness problems this is not possible. Instead, the best available indicators will be used to interpolate and extrapolate the annual estimates, and where no satisfactory indicators are available a mathematical procedure will be used.

For chain volume measures of health and community services industry gross value added, Medicare data on medical services attendances will be used as an indicator. In the case of education, no quarterly output indicators are available. The existing input-based indicator has

been considered but eventually rejected in favour of a mathematical procedure.

CHANGES TO OTHER SERVICE INDUSTRIES

The new ABS price indexes for service industries are designed to measure price change for services of constant quality. They will replace the input-based price indexes currently used to derive annual volume estimates of output, thereby allowing the annual chain volume estimates of gross value added (derived by subtracting volume estimates of intermediate input from volume estimates of output) to fully reflect changes in productivity.

The new price indexes will also be used in conjunction with newly available quarterly income data to derive chain volume indicators of output for a number of service industries, including all or part of property and business services, transport and storage, and communication services. The improved quarterly indicators will then be used to interpolate and extrapolate the annual chain volume estimates of gross value added.

The new method will be implemented for most estimates from September quarter 1999.

FINAL CONSUMPTION EXPENDITURE

In a fully balanced national accounting system, the supply of products in the economy must equal the use of those products. This balancing is achieved for annual estimates through the supply and use tables which form the benchmarks for the gross domestic product account. Therefore the methodological changes described above will also impact on the expenditure side of the account.

The main impact will be in the calculation of chain volume government final consumption expenditure. In order to maintain balanced accounts, the chain volume estimates for government final consumption expenditure on health and education

services will reflect the new chain volume estimates for the output of the government components of the education and health services industries. The remaining non-market components of total government final consumption expenditure will continue to rely on input methods (until suitable output indicators are found).

No changes are anticipated to the methods for deriving chain volume estimates of household final consumption expenditure as satisfactory output-based methods are already being used. In addition, the changes to the method for measuring the output of the marketed services will mainly affect intermediate consumption, which does not have any impact on final consumption expenditure.

STATE AND TERRITORY ESTIMATES

Chain volume estimates of government final consumption expenditure by State and Territory will be benchmarked to the revised national estimates. The new output volume indicators for health and education are available annually by State and Territory and will therefore be used directly. Quarterly State and Territory estimates will be benchmarked to national totals.

As for the national estimates, current price estimates will continue to be estimated as before.

PRODUCTIVITY MEASURES

ABS productivity statistics exclude health and community services, education and the other industries that currently rely on input methods to derive chain volume estimates of gross value added. The new chain volume estimates for health and community services are judged to be of good enough quality to permit the inclusion of this industry in productivity statistics with appropriate caveats.

On the other hand, the new chain volume estimates for education value added, while superior to the existing input-based estimates, do not support meaningful productivity estimates. For example, an increase in class sizes would be reflected directly in productivity statistics.

It is expected that property and business services will also be added to the list of industries included in the market sector productivity estimates once a sufficient time series of chain volume estimates become available on the new basis.

FUTURE DEVELOPMENTS

The ABS plans to continue to seek improvements to the methods which it uses to measure the output of non-market services industries. A detailed study has already been undertaken into measuring the output of public order and safety and justice services, the results of which have been published in the ABS Discussion Paper Experimental Output Measures for the Australian Justice Sector. While satisfactory results were obtained for some of these industries, they are too small to justify the incorporation of the new estimates into the accounts on their own. It was not possible to compile satisfactory estimates for police services, the largest industry in this group, but there are hopeful prospects for the future. It is also planned to investigate the use of administrative data to derive output measures for various government agencies. The ABS will continue to monitor international developments in relation to potential quality adjustment indicators.

The existing method for the measurement of the output of hospitals is currently based on using details of acute in-patient separations, but as more treatments are carried out on an outpatient basis it is clear that there will be a need to capture data on outpatients at a detailed level. The ABS plans to investigate new data collections that are currently underway to capture this activity.

FURTHER INFORMATION

For further information on the new chain volume estimates for the services sector contact Maire O'Mahony on Canberra 02 6252 5381 or e-mail maire.omahony@abs.gov.au.

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